Area of Concern (AOC): Tijeras Arroyo Groundwater

ADS: 1330
Operable Unit: Site Wide Hydrogeologic Characterization

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Site History

In 1992, the Sandia National Laboratories/New Mexico (SNL/NM) ER Project began conducting groundwater studies at Technical Area-II (TA-II). The TA-II studies along with other Solid Waste Management Unit related investigations eventually were incorporated into the Tijeras Arroyo Groundwater (TAG) Investigation. In addition to work conducted by the ER Project, the TAG Investigation has recently incorporated groundwater investigations conducted by the Kirtland Air Force Base (KAFB) Installation Restoration Program and the City of Albuquerque (COA) Environmental Health Department.

Trichloroethylene (TCE) and nitrate have been identified as the contaminants of concern (COCs) for the TAG study area with groundwater being the only exposure pathway applicable to the TAG Investigation. TCE is a chlorinated solvent typically used for degreasing operations. Nitrate is principally a degradation product of septic waste. The state and Federal drinking water standard (the maximum contaminant level [MCL]) for TCE is 5 micrograms per liter (µg/L), which is equivalent to 5 parts per billion. The state and Federal MCL for nitrate is 10 milligrams per liter (mg/L), which is equivalent to 10 parts per million (ppm).

The TAG study area is currently defined as an approximately eight-square mile, rectangular area that is centered on the intersection of Wyoming and Hardin Boulevards in the north-central portion of KAFB. The study area is bounded on the east by Manzano Base, on the west by the KAFB boundary along Yale Boulevard, on the north by Lomas Boulevard, and on the south by a line that extends from the Tijeras Arroyo Golf Course to Montessa Park.

The potential release sites of TCE and/or nitrate in the TAG study area include sewage lagoons, waste-water outfalls, septic systems, landfills, sewer lines, and the Tijeras Arroyo Golf Course. Based upon the historical use and disposal of chlorinated solvents, the extent of TCE in groundwater is probably associated with multiple aqueous releases of solvents and subsequent

vapor-phase transport through the vadose zone. Nitrate in groundwater is probably derived from the release of sanitary waste and the application of fertilizers.

The hydrogeologic setting of the TAG study area is dominated by two water-bearing zones, the perched system and the regional aquifer, both of which are present within the upper Santa Fe Group. The perched system is not used for water supply. The COA, KAFB, and the Veterans Administration (VA) utilize the regional aquifer for water-supply purposes. In the central portion of the study area, the upper surface of the perched system is present at depths ranging from approximately 220 to 330 feet (ft) below ground surface (bgs); the perched system covers approximately 3.5 square miles and may extend across the northern boundary of KAFB. The direction of groundwater flow in the perched system is to the southeast. Discontinuous, yet overlapping multiple lenses of unsaturated alluvial-fan sediments serve as a perching horizon beneath the perched system and above the regional aquifer. The upper surface of the regional aquifer is present at approximately 440 to 570 ft bgs in the central portion of the study area. In the TAG study area, the direction of groundwater flow in the regional aquifer is principally to the northwest towards the KAFB, COA, and VA water-supply wells. Groundwater in the perched system merges with the regional aquifer southeast of Tijeras Arroyo. The regional aquifer extends across the entire study area and the Albuqureque Basin.

Historically across the TAG study area, the maximum concentrations of TCE and nitrate in the perched system have been 9.6 µg/L and 44 mg/L, respectively. For the regional aquifer, the historical maximum concentrations of TCE and nitrate have been 3.2 µg/L and 49 mg/L, respectively. The following conclusions can be made:

- The distribution of TCE in the perched system is sporadic across the study area and is indicative of discrete TCE occurrences, not widespread contamination.
- The occurrence of TCE in the regional aquifer is negligible.
- The distribution of nitrate above the background level (4 mg/L) is laterally widespread in the perched system, yet discontinuous across the study area.
- Concentrations of nitrate in the regional aquifer above the background level (4 mg/L) are scattered across the TAG study area.

Constituents of Concern

TCE and nitrate.

Current Hazards

No hazards are present in surface or subsurface soils.

Current Status of Work

The first comprehensive SNL/NM groundwater document was the 1996 Sandia North Groundwater Investigation Plan. A pair of Sandia North status reports were prepared in 1998 and 2000. In late 2000, the term 'Sandia North' was replaced by 'Tijeras Arroyo'. The November 2002 TAG Continuing Investigation Report presents an integrated overview of all the SNL/NM,

KAFB, and COA groundwater studies conducted in the TAG study area, and includes well completion diagrams.

The types of studies conducted in the TAG study area include groundwater sampling, soil-vapor sampling, borehole sampling, aquifer testing, colloidal borescope, borehole geophysical surveys, seismic surveys, and site-specific soil sampling. Process knowledge has been acquired by the review of engineering drawings, historical aerial photography, utility plans, and various documents.

As of January 2003, SNL/NM had installed 30 monitoring wells (25 groundwater and 5 soil-vapor) in the TAG study area. KAFB had installed 28 groundwater monitoring wells. The COA had installed 5 groundwater monitoring wells near the Eubank Landfill.

SNL/NM conducted quarterly groundwater sampling in the TAG study area until April 2002, but has since curtailed sampling activities until NMED provides additional guidance. Groundwater sampling results from March/April 2002 are the most recent and complete analytical data set for the TAG study area. Groundwater samples were collected from 50 of the 64 monitoring wells in the current monitoring well network (SNL/NM, KAFB, and COA monitoring wells). The maximum concentration of TCE in the perched system was 7.5 µg/L. Only two of the monitoring wells had TCE concentrations that exceeded the MCL of 5 µg/L. None of the regional-aquifer monitoring wells yielded samples with detectable concentrations of TCE.

For the March/April 2002 sampling event, the maximum concentration of nitrate in the perched system was 30 mg/L. A total of 26 perched-system monitoring wells had nitrate concentrations that exceeded the background level of 4 mg/L. Ten of the 26 perched-system monitoring wells had nitrate concentrations that exceeded the MCL (10 mg/L). For the regional aquifer, the maximum concentration of nitrate was 18 mg/L. A total of eight regional-aquifer monitoring wells had nitrate concentrations that exceeded background (4 mg/L). Three wells had nitrate concentrations that met or exceeded the MCL (10 mg/L).

Future Work Planned

SNL/NM has suspended TAG-related groundwater sampling and drilling until NMED comments are received for the TAG Work Plan (version August 29, 2002). KAFB and the COA continue to collect groundwater samples.

The TAG Work Plan identified data gaps and presented an approach for completing the characterization of TCE and nitrate contamination in groundwater in the TAG study area. Six monitoring wells are proposed for completion in the perched system, assuming that producible quantities of groundwater are encountered at each location. Two of the monitoring wells are proposed for installation on KAFB property. Four more monitoring wells are proposed for the vicinity of the Eubank Landfill. In addition, five soil-vapor boreholes also are proposed; soil-vapor samples will be collected at multiple depths to a maximum depth of approximately 250 ft and analyzed for TCE. A total of 51 groundwater monitoring wells (45 pre-existing and 6 proposed) will be sampled for six quarterly events. The first event will occur after the proposed monitoring wells are installed and properly developed. The groundwater samples will be

analyzed using EPA methods 8260 and 353.2 for TCE and nitrate, respectively. Additional parameters will be measured for a select number of monitoring wells to assess aerobic/anaerobic conditions, denitrification potential, and conditions relevant for monitored natural attenuation. After the six groundwater-sampling events are completed, the analytical data will be evaluated to determine if the preparation of the final report is warranted, or if a corrective action is needed.

Waste Volume Estimated/Generated

No hazardous or radioactive waste has been generated.

Information for ER Site TAG was last updated Jun 11, 2003.